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ABSTRACT

The effects of imagery on the recognition of subunits within a textual passage were investigated. College students first rated the subunits of a textual passage with respect to imagery. A different group of subjects was then given the passage to read, and these subjects were subsequently tested for recognition, either immediately or one week later. Recognition performance for the immediate test group was superior to that of the one-week delay test group. In addition, subjects correctly recognized more of the subunits read high in imagery. Implications for future research and education were discussed. (Author)

Imagery and the Recognition of Textual Prose[1]

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An important line of investigation in prose research has been the determination of the task variables affecting retention. While most researchers have been concerned with the variable of meaningfulness, recent work, stimulated by the theorizing and findings of Paivio and his associates (see for example, Paivio, 1965; 1969; 1971), has indicated that the variable of imagery is an important determiner of prose retention. For example, Yuille and Paivio (1969) reported that concrete paragraphs are recalled better than abstract ones, while Montague and Carter (1973) found that their subjects were able to recall more substance words from narratives rated as high imagery than those rated as low imagery. In further support, Anderson and Kulhavy (1972) found that subjects who reported the use of imagery during learning of a 2,000 word passage recalled more than those subjects not reporting the use of imagery. And finally, Johnson (1972a) found that concreteness was significantly related to phrase recall at both immediate and delayed recall intervals. Indirect support comes from Pompi and Lachman (1971) who argue that imagery may be one of the surrogate processes underlying retention of connected discourse.

A second line of investigation has been concerned with the segmenting of prose material into units which are psychologically meaningful and appropriate. Since Levitt (1965) has shown (a) that there is little inter- and intra-agreement among experimenters segmenting connected verbal stimuli, and that (b) the method of segmenting clearly influences mean recall, segmenta-

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tion is an important task variable, but difficult to deal with. Consider the various segmenting that could be used with imagery. In a prose study an investigator could define the conceptual unit for the investigation as a single word (Paivio, 1965) or as an entire sentence (Begg, 1971; Begg & Paivio, 1969). Or, as has been reported above, the investigative unit could be a phrase (Johnson, 1972a) or the theme of an entire passage (Anderson & Kulhavy, 1972; Montague & Carter, 1973; Yuille & Paivio, 1969).

Studies segmenting prose into phrase units appear to be especially promising since Psycholinguists have shown that subjects process spoken sentences in units paralleling the major constituent breaks in the surface structures of sentences (Fodor & Bever, 1965; Garrett, Bever & Fodor, 1966). The present study, then, attempts to expand upon the pausal segmentation unit (Johnson, 1970; 1972a; 1972b; 1973). Pausal units are defined by subjects' objective ratings of locations within a prose passage acceptable for pausing. Raters are instructed that the functions served by pausing are to (a) catch a breath, (b) emphasize a portion of the narrative, or (c) enhance meaning. A pausal unit is defined when a majority of raters agree that a location is an acceptable location for pausing. In the present study pausal units will be rated on imagery and then recognition tested. It is predicted that recognition for high imagery phrases will be superior to recognition for low imagery phrases.

Methods and Procedures

Stimulus Materials. One textual passage was used, entitled "The Role of Language in Learning". This passage, with a difficulty level appropriate for college sophomores, had been previously segmented into pausal units by a sample of 52 college students (Johnson, 1973).[3] To obtain these pausal ratings

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[3] The authors wish to express their indebtedness to Ron E. Johnson for providing a copy of the stimulus material and pausal unit ratings.

the subjects were presented the passage and instructed to indicate the points at which pauses were most likely to occur. They were told that "the function served by making a momentary pause might be to catch a breath, to give emphasis, or to enhance meaning". Sixty units were so defined in which the mean word length was 10.8, SD = 4.8. Seven of the 60 units were complete sentences. When the sample of raters was randomly split into two groups and their reliability computed, their ratings were found to be highly correlated ($r = .98$).

Test Materials. In the recognition test, the test phrases were presented in groups of four, of which one of the four was a correct phrase being taken word-for-word from the passage; the other three were incorrect phrases. The foils consisted of both wording changes (paraphrased versions of the correct phrases) and meaning changes (both semantic and lexical). Each subject was tested on the 15 highest and 15 lowest imagery phrases.

Within a set of four test phrases, attempts were made to equate the lengths and the imagery values of the phrases. To test the equation of imagery values within a set of test phrases, ten subjects were presented the test stimuli and asked to select the one phrase, from each group of four, that most easily elicited a sensory image. If the imagery values of the correct phrases were equivalent to the imagery values of the foils the correct phrases should be selected with a probability of .25. These subjects selected .21 of the correct high imagery phrases and .22 of the correct low imagery phrases.

Subjects. Forty-one subjects were used to rate the pausal units on imagery. Ten subjects participated in a preliminary investigation of the test material. Sixty different subjects participated in the recognition test. All subjects were male and female undergraduate students at the Ohio

University. For their participation subjects received extra course credit.

Design. A two factor design, repeated on one measure, was used. The between factor was length of the retention interval, either an immediate test or a 1-week delayed test. The within factor consisted of phrase imagery, either high or low.

Procedure. To obtain ratings on the imagery values of the pausal units, the 41 subjects were presented the passage, in a segmented form, and given instructions similar to those used by Paivio, Yuille, and Madigan (1968). Subjects were told to rate each pausal unit with respect to "the ease with which it aroused a sensory image". Ratings were made on a 7-point scale, where 1 represented the low end of the scale and 7 the high end. Subjects were instructed to first read through the phrases and "think about the values" they would assign. On a second reading, subjects were to actually assign values to the phrases.

Having obtained ratings on the imagery values of the pausal units, the recognition experiment was conducted. Subjects, reporting in small groups (from 5-7), were randomly assigned to either the immediate test condition or the 1-week delayed test condition. (Thirty subjects participated in each test condition.) Subjects were presented the passage and told to read the passage to themselves twice, at their normal reading rate. They were told that "at some future time you will be tested on the accuracy of your recall". After all subjects had finished the passage, those in the immediate test condition were given the following recognition task. Subjects were presented the test phrases and instructed to circle the correct one. Subjects were given as much time as they needed. Upon completion of the task, subjects were completely debriefed. Those subjects in the 1-week delayed condition were dismissed after reading the passage and instructed not to discuss the

experiment. Upon arriving one week later, they were given the same test and fully debriefed. (Four different random orders of the test were used, but order was not included as a factor in the design.)

Results

Imagery Ratings of Pausal Units. The mean values of the 15 high imagery phrases ranged from 4.14 to 5.73; while the mean values of the 15 low imagery phrases ranged from 2.68 to 3.31. A t-test, comparing the high imagery phrase values to the low imagery phrase values showed that the two groups differed significantly on rated imagery ($t(28) = 15.54$, $p < .001$).

Measurement of Recognition Performance. Subjects' responses were scored 0 if incorrect and 1 if correct and an analysis of variance was performed. In this analysis both main effects were found to be significant: phrase imagery, $F(1, 58) = 270.11$, $p < .001$, and retention interval, $F(1, 58) = 5.77$, $p < .025$. The interaction was not significant. Figure 1 presents the mean number of correct recognitions for the high imagery phrases and the low imagery phrases at each retention interval. From this figure, it is seen that subjects correctly recognized a greater number of high imagery phrases at each retention interval, with immediate recognition superior to 1-week delayed recognition. It is also noted that 1-week delayed recognition for high imagery phrases is superior to immediate recognition for low imagery phrases.

Discussion

The present study has found continued support for the importance of imagery in learning by the finding that imagery is strongly related to the recognizability of subunits (pausal units) within a prose passage. Similar to Johnson (1972a) this effect was evident at both an immediate and a 1-week delayed test. The most plausible explanation for this observed effect is that concrete phrases are coded in memory as nonverbal spatial units, which are highly distinctive, while abstract phrases are coded in memory either as

verbal sequential strings or much less distinctive images. Greater coding, storing, and retrieval difficulties are encountered with abstract phrases, hence poorer recognition performance (Begg, 1971; Begg & Paivio, 1969; Paivio, 1971). Since 14 of the 15 high imagery test phrases and 9 of the 15 low imagery test phrases contained more than one noun, it is likely that the phrases were represented in memory as composite, integrated images (Begg, 1972; Paivio, 1971). It is noted that Johnson, Bransford, Nyberg, and Cleary (1972), finding that abstract sentences are more difficult to comprehend than concrete sentences, have argued against this dual storage mode of input coding. It may be that comprehensibility exerted some influence on the present results.

The generalizability of the present findings is limited in that only one textual passage was investigated. To extend the generality, a further study is suggested in which an additional passage is tested. Also, since no attempts were made to control for the effects of extraneous variables, the possibility exists that another correlated variable caused the effects in the present study. The most likely variable would be meaningfulness. Paivio (1971) reports a study in which both imagery-concreteness and meaningfulness were varied independently in a recognition memory experiment. At the time the study was conducted normative data was available for only a small sample of nouns. Although with this limited control, the experimenter was still able to show that imagery-concreteness had a highly significant positive effect independent of meaningfulness (and frequency, also). While it seems a logical step to assume the same finding holds true for prose investigations, additional studies are needed in which imagery and meaningfulness are varied independently to actually test this.

Perhaps the most important scientific implication is that this study, further demonstrating the feasibility of applying an imagery analysis to

subunits of textual prose, helps to tie the research area of prose learning to a rapidly growing body of resear on imagery. The educational implications of the study of imagery have been best pointed out by Rohwer (1970) who stated that imagery research is relevant for education because the research is concerned with (a) the properties of the learning materials that facilitate acquisition and (b) discovering the mental activities of the learners that result in efficient performance. Implications for education concern "... the manner in which information can best be presented to children in order to foster acquisition and retention," and "... the kinds of activities children should be taught to engage in so as to increase their own powers of learning (p. 402)."

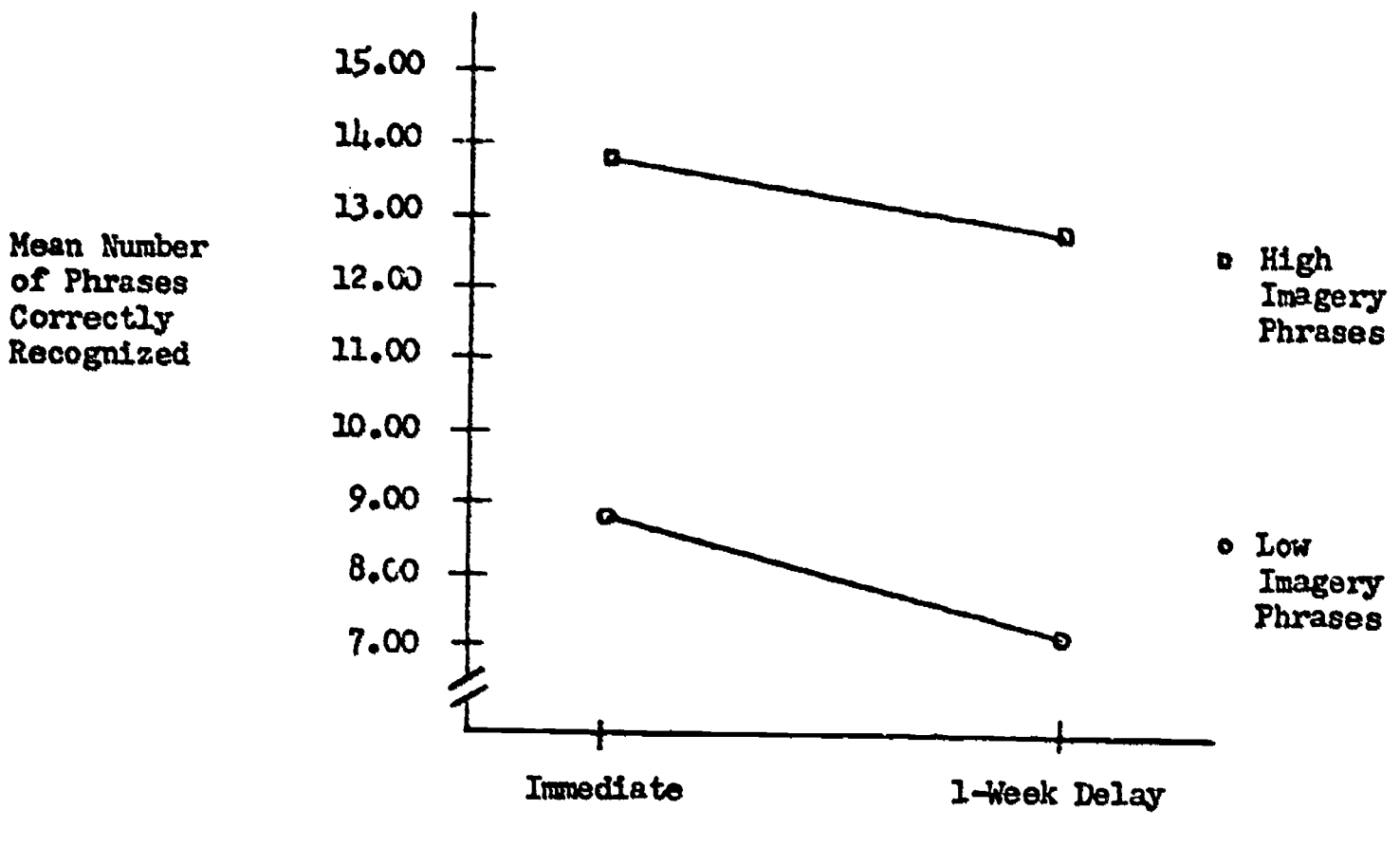

Figure 1. Performance in the recognition test.

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